XVI. *A Letter from Mr.* Turbevil Needham, *to the* PRESIDENT; *concerning certain chalky tubulous Concretions, called* Malm: *With ſome* Microſcopical *Obſervations on the* Farina *of the* Red Lily, *and of* Worms *diſcovered in* Smutty Corn.

SIR,

Read Dec. 22. 1743. THough you deſired me, when I had the Satisfaction of waiting upon you at *London* ſome Weeks ago, to commit to Writing the Obſervations I had made upon that chalky, alkalizate Subſtance, which they here apply to Manure, and call *Malm*; yet I purpoſely deferred complying with my Engagement, till a Review of ſome Particulars, which I had before obſerved but ſlightly, as well as ſome additional Remarks, which I have ſince made, ſhould enable me to give in a more ſatisfactory Account, than I could engage to do at that time——. This Bed of Malm lies in a Valley, at the Foot of a long Ridge of chalky Downs; extends from *Wincheſter*, where it begins, as I have been informed, almoſt due South, about Four meaſured Miles; the Breadth not above a Quarter of a Mile; and Depth, at a mean Computation, about Five Foot. It is uſed in Manure for the ſame Purpoſes as Chalk is, but anſwers the Intent much better. It riſes up in one continued Bed, almoſt to the Surface; where a thin Layer of common Earth but juſt hides it in all Places, where con-

continual Cultivation has not ſuperinduced a new Soil. Horſetail, and a Species of Wild Trefoil, grows out of it very plentifully, eſpecially the firſt, which ſink their fibrous Roots to a conſiderable Depth in it: The whole Bed conſiſts of ſeparate detached Pieces, in the Nature of thoſe which you have by you, and of ſeveral Dimenſions, as thoſe are, moſtly long and tubular; ſome few round, with a ſmall Cavity in the Centre, others quite flat, and ſome, as it were, excavated on one Side, as if the chalky *Laminæ* had extended themſelves round a Piece of Bark; but all of them hollowed within, agreeable to their exterior Shape, except very few. I believe it may be aſſerted, with ſome Confidence, that this Valley formerly was over-run with Wood, if not wholly, at leaſt for ſome conſiderable Length and Breadth: Wild Boars Tusks, which are known by their Length; Stags-horns, and a Flint-knife, which have been found buried to ſome Depth, in the Malm, ſeem to evince as much. That Trees of conſiderable Dimenſions have grown in it, is very evident; for, in a Drain, which they have lately made to convey the Water from the main River to the adjacent Meadows, Trees of a vaſt Size may be ſeen, at Two or Three Feet Depth, in no ſmall Number, retaining both Shape and Subſtance in ſome meaſure, though much decayed, and not ſo compact and ſolid in thoſe Parts, which have been expoſed to the Water; theſe lie out of the Verge of this Bed of Malm, and are not conſequently affected by it. Now I am much inclined to think, that theſe Trees, together with the reſt of the Wood, might, by Age, and ſome Accident combining with it, have fallen; the uppermoſt might have ſerved to bury

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the reſt, and preſerve them from a more immediate Decay, by cutting off their Communication with the exterior Air. Rains, in Proceſs of Time, muſt have waſhed off from the adjacent Hills to ſome certain Diſtance, and depoſited in the neighbouring Valley, but mixt with other heterogeneous Subſtances, as decayed Wood, Earth, *&c.* a Quantity of chalky Particles, ſufficient to involve, by a continual Addition of new *Laminæ*, Roots, Trunks, Branches, Twigs, and the broken Extremities of Twigs; and tending continually to form Maſſes reſembling the ſuppoſed Particulars. I don't now imagine, tho' I once thought ſo, that theſe chalky Particles have penetrated the Wood itſelf, and converted it into its own Subſtance, in the Nature of ordinary Petrification, except here-and-there ſome few particular Pieces; but I rather ſuppoſe, that the Pieces of Wood have been inveſted continually by additional *Laminæ*; that the firſt *Laminæ* muſt have adapted itſelf to, and aſſumed the exterior Shape, whether ſmooth or knotty, of the incloſed Wood; that the others have proceeded accordingly; that the Extremities have gradually rounded themſelves; and that in the Interim, till they were wholly cloſed, the included Wood has been inſenſibly attenuated by the paſſing Moiſture, and, Particle by Particle, either intirely, or in Part only, waſted away. And, though it may be objected againſt this Suppoſition, that ſome Pieces are intirely ſolid, as one of thoſe two large Pieces is which you have by you, and has the Reſemblance of White-thorn; yet theſe are but rarely found, and may very well be ſuppoſed to have been a Species of Wood of a more ſolid and durable Contexture; which might conſe-

quently withſtand any conſiderable Attenuation by Water, long enough to permit the chalky Particles to penetrate, fix, and convert it into its own Subſtance; while other Woods, leſs tenacious, inſenſibly waſte, and are carried off by the inſinuating Liquid, together with the chalky Particles, which they not only could not arreſt, but prevented effectually, by a Blending and Interpoſition of their own Parts, from adhering to each other.——The Reaſons, why I apprehend the Proceſs of the Whole to have been in the manner deſcribed above, and anſwerable to my Suppoſition, are, firſt, the cloſe Vicinity, I may almoſt ſay, Contact of the chalky Hills, upon which this Bed of Malm attends throughout the whole Line, and no farther. Secondly, That this Malm is an Alkalizate Body, in a Degree ſomething inferior to Chalk, as I found upon a Trial, ſome time ago, by putting equal Portions of each into equal Quantities of double-diſtilled Vinegar, and meaſuring the Height of the Fermentation in a long cylindrical Glaſs. Thirdly, The Reaſons, which I gave above, for ſuppoſing that this Valley formerly has been over-run with Wood. Fourthly, The Diſpoſal of the ſeveral detached Pieces of Malm, which lie in all manner of Directions. Fifthly, The Reſemblance which they bear to Roots, Trunks, Branches, Twigs, *&c.* Sixthly, Some additional Obſervations, which I have made ſince my Return from *London*; and thoſe, I think, are almoſt deciſive. In the Hollow of ſome of the oblong tubular Pieces, which were cloſed at both Ends, upon breaking them open, I found the Remains of the included Wood attenuated to a mere Thread, which, though extremely tender, I could plainly diſcover to be Wood, both by

its exterior Appearance, as well as by rubbing in my Hand, in order to try if it would colour it, as decayed Wood, that has imbibed Moiſture, will do. Within the *Laminæ* of ſeveral, I found a fair Impreſſion of Leaves, in no ſmall Number, and with little Trouble: The Leaves I knew not, as not being very familiar in the Vegetable World, though they appeared to me much to reſemble White-thorn-leaves in their Shape, differing in this alone, that the Impreſſion of the fore Part of the Leaf had many ſmall indented Cavities, equal in Size to a Pin's Point, which had been formed by ſmall Protuberances in the Leaf itſelf. Some Pieces I found quite flat, as if the chalky *Laminæ* had involved a Chip, and the Cavity conſequently went off inſenſibly leſs towards each Extremity. Others I found, whoſe Cavities at the Extremities were irregularly ſhaped, agreeable to the jagged Ends of broken Sticks. Some, in fine, I found excavated on one Side, and convex on the other, as if the *Laminæ* had ſurrounded a Piece of Bark. Theſe are the chief Obſervations which I have hitherto made, and which, I hope, are ſufficient either to fix the Point where I have placed it, or to enable you to draw better Conſequences; a Communication of which, at your Leiſure, would pleaſe me much more than my own Suppoſition does, and inhance my paſt Obligations. I cannot ſay, that I am ſo thoroughly ſatisfied with what I have advanced, as to judge it unqueſtionable; though I am ſenſible, that the finding of ſeveral Maſſes of Malm, the Structure of which is not reducible to, nor explicable by, this Scheme, is no Objection to it; becauſe, as every one knows the Tendency which chalky Particles have to diſpoſe them-

themſelves in *Laminæ*; ſo theſe *Laminæ* may involve Bodies of different Kinds, as Parts of the fibrous Roots of Weeds, ſmall Seeds, or the like; may aſſume their Shapes, increaſe continually in Bulk, and inſenſibly raiſe the Height of the Bed, where they are firſt formed. Perhaps an Examination of thoſe Pieces of *Malm*, which you have by you, may enable you to form a better Judgment of the Whole.

I beg Leave to add a few Particulars relating to ſome microſcopical Diſcoveries I have lately made. Upon viewing an Infuſion of the *Farina Fœcundans* of the *Lilium rubrum flore reflexo* in common Water, I thought I perceived ſome Alteration in ſeveral of theſe minute Bodies, as if the outward Shell or Husk had, at a ſmall lateral Orifice, ſhed a long Train of Globules adhering to each other, and enveloped in a filmy Subſtance. I, immediately upon this, applied ſome freſh *Farina*, adapted my Microſcope before-hand, with the Tip of my Bruſh dropped a ſmall Globule of Water upon the Object, and in a few Seconds, I plainly perceived a Rope of exceeding ſmall Globules to be ejaculated with ſome Force from within, and contorting itſelf from one Side to the other, throughout the whole Line, during the time of Action, which does not laſt above a Second or Two, and is to be expected from a few only of theſe farinaceous Globules. Theſe emitted Particles are very different from the ſmall Globules of Oil, with which the *Farina* of the Lilly abounds; for theſe diffuſe themſelves equally on all Sides, while thoſe, on the contrary, go off in one continued Train, like the ejected Pulp of a roaſting Apple; and are involved in a filmy Subſtance, as the Eggs of ſome

aquatic Inſects are. I have ſince choſen the *Farina* of a Pompion to repeat this Experiment upon, which is not of an oily Nature; and, upon account of its Size, may be conveniently obſerved with the Second Magnifier, where I have the Advantage of a larger Field. I viewed ſome few of theſe alſo out of the many farinaceous Globules, which were within the Area of my Microſcope, with the ſame Succeſs, and yet greater Pleaſure: For I could plainly perceive, during the time of Action, by Two or Three lucid Specks in the Centre of the Globule, which continually ſhifted their Places, an inteſtine Commotion within the farinaceous Corpuſcle, and a ſtronger Ejaculation of the emitted Particles. Mr. *Chambers* ſays in his Dictionary, that no Alteration has been obſerved upon the Infuſion of the *Farina* in Water: But this, I apprehend, is owing to the Obſerver's not being ready with his Microſcope, and preſent at the time of Action, which is almoſt inſtantaneous; and, as the Orifice at which theſe Particles emerge, is but ſmall, it produces no very ſenſible Alteration in the Globule itſelf.

Upon opening lately the ſmall black Grains of ſmutty Wheat, which they here diſtinguiſh from blighted Corn, the latter affording nothing but a black Duſt, into which the whole Subſtance of the Ear is converted; I perceived a ſoft white fibrous Subſtance, a ſmall Portion of which I placed upon my Object-plate: It ſeemed to conſiſt wholly of longitudinal Fibres bundled together; and you will be ſurpriſed, perhaps, that I ſhould ſay, without any the leaſt Sign of Life or Motion. I dropped a Globule of Water upon it, in order to try if

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the Parts, when ſeparated, might be viewed more conveniently; when, to my great Surprize, theſe imaginary Fibres, as it were, inſtantly ſeparated from each other, took Life, moved irregularly, not with a progreſſive, but twiſting Motion; and continued ſo to do for the Space of Nine or Ten Hours, when I threw them away. I am ſatisfied they are a Species of aquatic Animals, and may be denominated Worms, Eels, or Serpents, which they much reſemble. This, if conſidered, will appear to be ſomething very ſingular: But I have ſince repeated the Experiment ſeveral times, with the ſame Succeſs, and gratified others with a Sight of it. I hope theſe few Diſcoveries will prove as agreeable to you, as they were to him, who begs Leave to ſubſcribe himſelf,

SIR,

Your moſt obedient
humble Servant,

Twiford, Aug. 11. 1743.

Turbervill Needham.

ERRATA.

In N° 468. p. 374. l. 22. for *nor ever* read *but:* And ib. l. 23. for *even* read *ever.*

N° 470. p. 551. under the Crown, *for* E. L. *read* E L.

N. B. At the End of N° 465. after p. 188. Two Leaves were cancelled; and therefore N° 466. begins at Page 193. and not with 189.

N. B. The ſpare *Titles* to N° 446. and to N° 467. may be cancelled.